

REMARKS

Claims 8-10, 18-20, 28-30, and 38-40 (Group II, selected in the June 15, 2006 response to the restriction requirement of May 18, 2006) are all the claims presently pending in the application. Claims 8, 18, 28, and 38 are amended to be in independent form and to more particularly define the invention. Claims 1-7, 11-17, 21-27, 31-37, and 41-53 are canceled as non-elected aspects of the invention and in an effort to expedite prosecution.

It is noted that Applicants specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 8-10, 18-20, 28-30, and 38-40 stand rejected under 35 U.S.C. §103(a) over Horimai (U.S. Patent Application Publication No. 2004/0062178) in view of Fuji (U.S. Patent No. 5,465,248).

This rejection is respectfully traversed in the following discussion.

THE CLAIMED INVENTION

The claimed invention is directed to an apparatus and method for holographic recording and reproduction. A piece of data is recorded on or reproduced from a holographic recording medium. The recording medium is in the form of a flat plate which includes a recording layer comprising a photosensitive material, and for which recording is achieved by an interference pattern of a coherent light beam. A pickup includes an objective lens which focuses the coherent light beam, for moving the objective lens along a recording track of the recording medium and detecting reflected light from the recording track to perform focus- and tracking-servo control. A relative velocity determination unit determines a relative velocity of a converging position of the objective lens with respect to the holographic recording medium. A driving unit changes a relative position of the objective lens with respect to an optical path of the coherent light beam. A control unit performs recording or reproduction during a predetermined period. The driving unit moves an incident optical path of the coherent light beam to the objective lens based on the relative velocity determined by the relative velocity determination unit. Interference fringes are generated by the coherent

light beam. A moving distance of a recording/reproducing position relative to the recording medium is controlled so as to fall within half a period of the pitch of interference fringes while recording/reproducing the piece of data.

In a conventional holographic recording apparatus and method, in order to record information in a certain volume in a recording medium with high density, the recording is performed for that volume of several cubic millimeters in a multiplexing manner using angular multiplexing or wavelength multiplexing. Signal light and/or reference light must be fixed at a predetermined recording or reproducing position in the recording medium for a predetermined time period in accordance with the sensitivity of the recording medium and photodetector. This causes difficulty in performing high-density recording and reproduction at high speed. Moreover, a high-precision paging control mechanism is required, which makes size reduction more difficult.

The claimed invention, on the other hand, avoids limitations on recording or reproducing speed, so as to enable high-speed and high-density recording and reproduction. The claimed invention determines the relative velocity of a converging position of the objective lens with respect to the holographic recording medium. The driving unit moves an incident optical path based on the relative velocity such that a moving distance of the converging position of the lens relative to the recording medium falls within half a period of the pitch of interference fringes during a time period for recording or reproducing the piece of data.

THE PRIOR ART REJECTIONS

The Examiner alleges that the claimed invention is obvious over Horimai in view of Fuji. This rejection is respectfully traversed.

The Examiner alleges that Horimai teaches certain features of the claimed invention. Applicants submit, however, that there are elements of the claimed invention, which are neither taught nor suggested by Horimai.

With regard to claim 8, the Examiner alleges that Horimai discloses "a driving unit for changing a relative position of the objective lens with respect to an optical path of the coherent light beam in such a manner that the relative velocity falls within a predetermined

range at least during a predetermined period,” as recited in withdrawn claim 1, from which claim 8 previously depended.

However, Horimai fails to teach or suggest “wherein the driving unit moves an incident optical path of the coherent light beam to the objective lens based on the relative velocity determined by the relative velocity determination unit such that a moving distance of the converging position relative to the holographic recording medium falls within half a period of the pitch of interference fringes.”

This feature is supported in the specification at least at p. 24, lines 14-24, and p.25, lines 1-16. Similar language is recited in independent claims 18, 28, and 38.

According to the present invention, a moving distance of a recording/reproducing position (i.e., interference position) relative to the recording medium is controlled so as to fall within half a period of the pitch of interference fringes during performing recording/reproducing a piece of data.

In more detail, there is provided in the present invention a “relative velocity determination unit” which determines a relative velocity of a converging position of the objective lens with respect to the holographic recording medium. When performing recording (i.e., in claim 8), the driving unit moves an incident optical path based on the relative velocity such that a moving distance of the converging position of the lens relative to the recording medium falls within half a period of the pitch of interference fringes during a time period for recording the piece of data (see page 24, lines 24-27).

According to this arrangement, there is provided with the apparatus a margin of moving distance changes (i.e., 50% of the pitch or interval of interference fringes) so that recording and reproduction can be performed with a sufficient S/N level without causing the detection system more complicated and causing the increase of manufacturing cost (see page 24, lines 14-25, and page 25, lines 1-16).

Horimai, however, instead discloses only that “the moving speed of the irradiating position 101 is adjusted to become equal to the moving speed of the information area 7.” Horimai, p. 13, para. [0156] (underline added) by the tracking servo circuit 87 (see Fig. 2). “[T]he objective lens 11 moves at a constant speed that is equal to the moving speed of the information recording area 7.” Horimai, p. 14, para. [162].

Fuji merely discloses a polygon mirror 8 which is controlled to perform a unidirectional scanning repeatedly such that the light beam follows the linear velocity of the disk 10, i.e., the light spot d_s is moved at the same speed as the linear velocity (see column 6, lines 42-50). Therefore, Fuji fails to overcome this basic deficiency of the primary reference Horimai.

Thus, turning to the clear language of the claims, Applicants submit that Horimai fails to teach or suggest “... wherein the driving unit moves an incident optical path of the coherent light beam to the objective lens based on the relative velocity determined by the relative velocity determination unit such that a moving distance of the converging position relative to the holographic recording medium falls within a half a period of the pitch of interference fringes at least during a time period for recording the piece of data, the interference fringes being generated by the coherent light beam”, as required by independent claims 8, 18, 28, and 38.

Therefore, Horimai fails to teach or suggest all features of the independent claims. Applicants respectfully request withdrawal of the rejections over Horimai.

CONCLUSION

In view of the foregoing, Applicant submits that claims 8-10, 18-20, 28-30, and 38-40, all the claims presently pending in the application, are patentably distinct over the prior art of record and are allowable, and that the application is in condition for allowance. Such action would be appreciated.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned attorney at the local telephone number listed below to discuss any other changes deemed necessary for allowance in a telephonic or personal interview.

Application No. 10/522,342
Attorney Docket: US01-04066PCT (FUJI.065)

To the extent necessary, Applicant petitions for an extension of time under 37 CFR §1.136. The Commissioner is authorized to charge any deficiency in fees, including extension of time fees, or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date: 7 Nov. 2006



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